

# Public Health Collaborative Efforts in Preventing Spread of CRE in MN



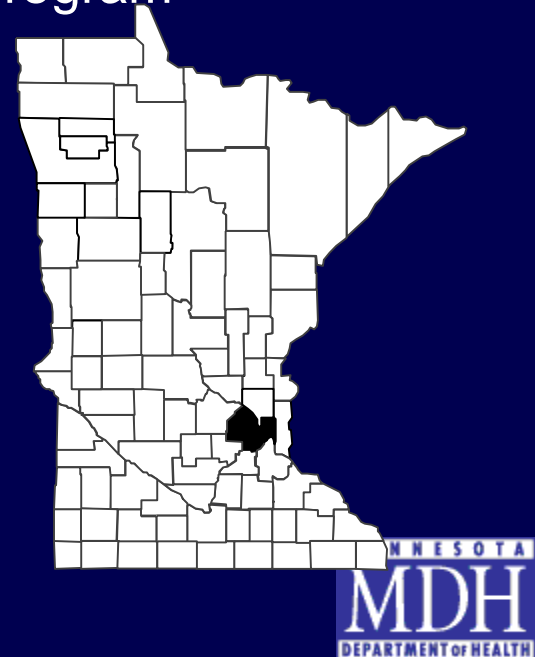
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# Emergence of Carbapenem-resistant Enterobacteriaceae (CRE) in Minnesota

- February 2009: MDH identified an isolate with *Klebsiella pneumoniae* carbapenemase (KPC)
- Alert sent to labs and healthcare facilities
  - Labs asked to submit carbapenem-resistant Enterobacteriaceae (CRE) isolates to the MDH Public Health Lab (PHL) for additional testing
  - MDH PHL did MHT if not done, and if MHT positive, PCR for *bla*<sub>KPC</sub>
- Initiated statewide, passive CRE surveillance
  - Infection preventionists encouraged to contact MDH to report cases

# Approach to Active CRE Surveillance

- Establish active, population-based laboratory surveillance for CRE and CR-Acinetobacter (CRA)
  - June 2010 Supplement Clinical Laboratory System Institute (CLSI) breakpoints
  - Multi-state Gram-negative Surveillance Initiative (MuGSI) through CDC Emerging Infections Program
- CRE and CRA reportable in Hennepin and Ramsey Counties
  - MN State Rule 4605.7046
  - Population: 1,662,490
  - Includes Minneapolis and St. Paul
- Develop infection prevention and control materials for healthcare personnel



# MDH CRE Active Surveillance in Hennepin and Ramsey Counties

- **Rationale for our approach**
  - MN early in the emergence of CRE
  - MN's two most populous counties
  - Lack of a standardized surveillance definition
  - Frequent patient movement across the continuum of care; potential for transmission
  - Healthcare-associated outbreaks
    - Documented success of infection prevention and control measures in preventing spread

# Lab Survey Summer 2010

- 6-question phone survey to identify lab methods of determining resistance phenotypes, ability to query IT systems, and CLSI standards used by participating microbiology labs
- Catchment Area
  - Hennepin and Ramsey Counties
  - Labs identified for all clinics, long-term care facilities and hospitals in catchment area
    - Almost all clinics and hospitals utilize one of 14 labs (10 hosp, 3 ref, and 1 clinic lab)
- Survey
  - 12 labs surveyed (1 ref. and 1 hosp. lab did not participate)

# Summary of Survey Results

- Methods of determining resistance phenotypes (CRE)
  - 67% screen using automated system + MHT
  - No labs perform PCR for *bla*<sub>KPC</sub>
- Ability to query
  - Labs could query IT systems by species, S-I-R, flagged organisms, or MIC, but ability to query the LIS was limited by resources
  - Labs most comfortable with software systems for their automated instruments
- CLSI standards
  - No labs using new carbapenem breakpoints (June 2010 CLSI)

# Lessons Learned

- Most labs lacked the resources to query their LIS
- Screening and confirmatory testing was not standardized between laboratories
- Automated systems and susceptibility cards varied between laboratories
- Labs had not instituted breakpoint changes
- Reporting of CR organisms was not standardized between laboratories
  - Only 8% and 58% of laboratories reported results to MDH epidemiology and PHL respectively

# 30-day Pilot Study

- **Preparation for 30-day Pilot**
  - 6 teleconferences and several individual calls with participating labs
  - Automated system representatives visited labs to set up queries based on June 2010 carbapenem breakpoints for Enterobacteriaceae
- **November 2010**
  - Query automated susceptibility system for total Enterobacteriaceae identified during 30-day period
    - Denominator for percent resistant
  - Submit CRE isolates weekly
    - With antimicrobial susceptibility test results (print-out from automated system/additional testing)

# 30-day Pilot Study Protocol

- Catchment area
  - Hennepin and Ramsey Counties
  - 10 hosp, 1 ref, 1 clinic lab (2 ref labs did not participate)
- Organisms
  - CRE: Enterobacteriaceae
    - Using 2010 CLSI Breakpoints: NS (I or R) to imipenem, meropenem ( $\text{MIC} \geq 2 \text{ mcg/ml}$ ); R to ertapenem ( $\text{MIC} \geq 1 \text{ mcg/ml}$ )
  - Carbapenem-resistant *Acinetobacter*
    - R to imipenem or meropenem ( $\text{MIC} \geq 16 \text{ mcg/ml}$ )
- Cases
  - Non-duplicate isolate from any source (sterile/non-sterile) for each specified phenotype/patient for a 30-day period

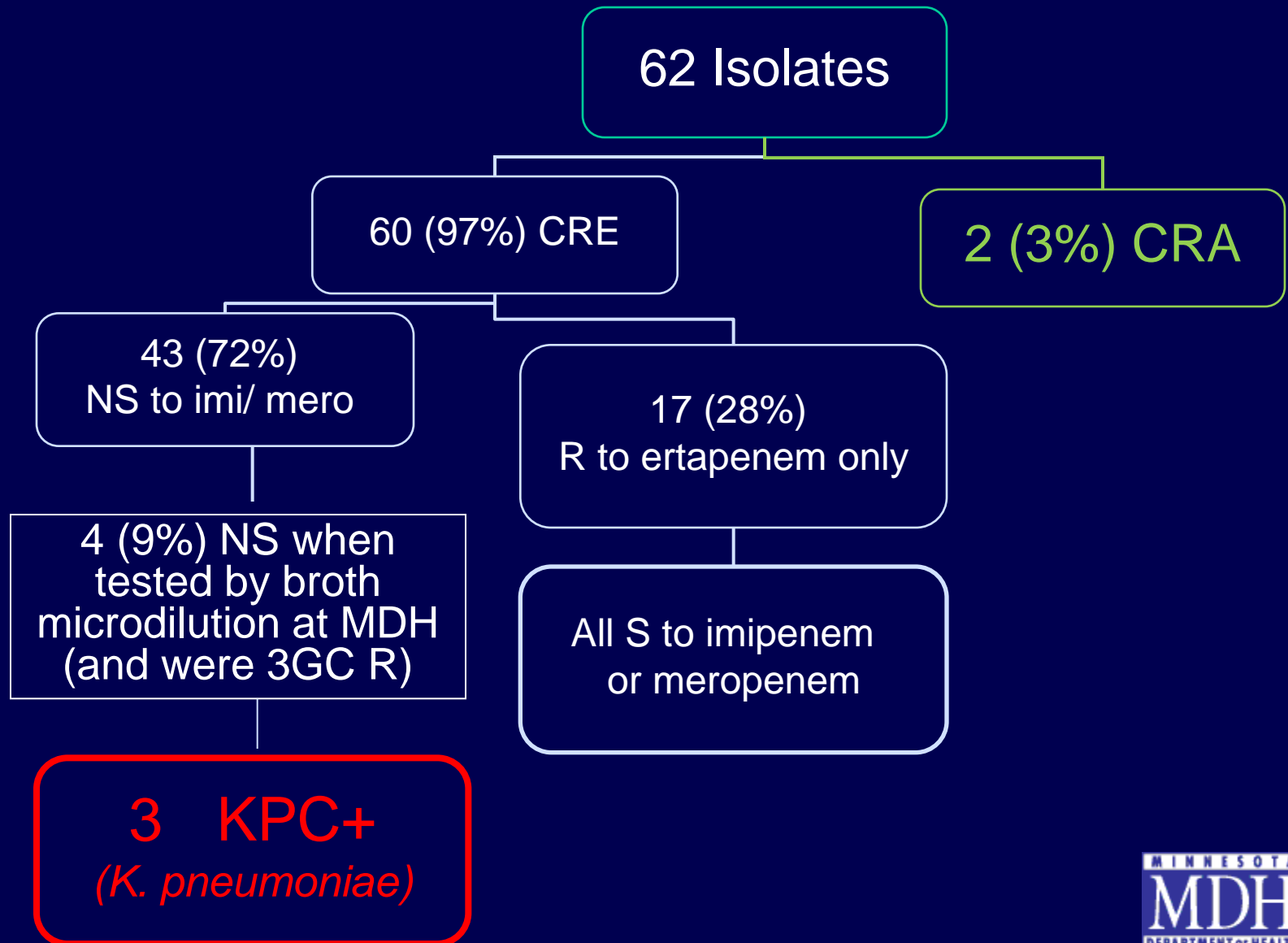
# Challenges and Solutions

- Denominator data: difficult for facilities without specific Vitek or Microscan software to pull de-duplicated denominator data
  - MDH staff went to two labs that did not have software to count/de-duplicate the denominators, micro-supervisor did it at another lab
- County of residence not readily available to clinical labs
  - MDH staff reviewed charts for cases to obtain county; for denominator data not able to obtain and therefore determining proportion resistant based on lab location

# Challenges and Solutions (cont.)

- None of the labs using new CLSI breakpoints, some automated instruments' cards did not go down low enough in dilution
  - Special queries were created when possible
- Large reference labs were too busy to spend time problem solving for the pilot
  - MDH worked with reference laboratory contacts to establish reporting protocol

# 30-day Pilot Results



# 30-day Pilot Lessons Learned

- Telephone survey was vital to rolling-out surveillance
- Work with the labs as partners- they want to participate but have little time or resources
  - Dedicated lab liason at the PHL who knew the lab supervisors and the field representatives and was available to organize project and problem solve
- 30-day surveillance:
  - New definition of CRE- incorporate 3<sup>rd</sup> generation cephalosporin resistance
  - Trial period before initiation of surveillance very useful
  - About half of CRE reported from acute care; however 33% from ER/outpatient and 20% from LTACH/LTCF

# Instituting Prospective Laboratory-Based Surveillance

- Important to include lab and IP staff
- Important for them to develop seamless communication to share and understand methods, results and implications for patient management
- Important for each to understand perspectives of the other
- MDH facilitated conference calls and meetings with both

# MN Surveillance for CRE, CRA

CRE: NS to imipenem, meropenem or doripenem  
AND R to 3rd generation cephalosporins

Emphasis on:

*Klebsiella* spp.

*E. coli*

*Enterobacter* spp.

CRA: R to imipenem or meropenem

# CRE and CRA Surveillance

- Labs:
  - Identify isolates through micro testing and automated system queries
  - Submit isolates and susceptibilities
  
- MDH:
  - Confirm cases (organism, susceptibilities, residency, source)
  - Complete case report form
  - Submit subset of isolates to CDC (as part of Emerging Infections Program)

<b>MDH CRE Isolate Submission Form</b>		[Project #1380]	
<b>Patient Information</b>			
First Name:		Last Name:	
<b>AST Information</b> <span style="float: right;"><i>*Please attach automated AST report *</i></span>			
Type of Commercial AST Instrument used:	Microscan	Phoenix	Vitek 2
Was a Modified Hodge Test done?	Yes / No	Positive / Negative	Test antibiotic: _____
Was an E-test done?	MIC: _____ MIC: _____ MIC: _____	Interp: _____ Interp: _____ Interp: _____	Antibiotic: _____ Antibiotic: _____ Antibiotic: _____
Was a Disk Diffusion done?	Zone size: _____ Zone size: _____ Zone size: _____	Interp: _____ Interp: _____ Interp: _____	Antibiotic: _____ Antibiotic: _____ Antibiotic: _____
Do you have results for any of the following:	Tigecycline Colistin Polymyxin B	MIC: _____ MIC: _____ MIC: _____	Zone size: _____ Zone size: _____ Zone size: _____
Were there any other tests performed?			

# Laboratory Isolate Submission

## Setting up the Surveillance

- Slow start
  - 2 labs with old Vitek just getting on board with Observa (information management system) in Jan 2012 and March 2012
- Weekly (Monday) email
  - Sent to lab contacts
  - Reminds them to run the query
  - Reply back “nothing this week” or fax report if patients identified
  - Send isolate with susceptibility report and MDH CRE form

# Lessons Learned

- Keep submission criteria simple
  - Ask labs to send in isolates from all sources
  - Don't worry about duplicate isolates – can be sorted out at PHL
- Have found isolates from one patient being submitted from multiple labs

# Instituting Prospective Laboratory-Based Surveillance- IP issues

- Specific communications with infection prevention and control groups regarding CRE
  - Recommendations for active surveillance
  - Recommendations for infection prevention interventions
    - In their facility
    - Patient movement between healthcare settings
      - Hospitals, ambulatory care, long-term care (LTC), long-term acute care (LTAC)
      - Lack of inter-facility communication

# MDH Recommendations for the Management of CRE in Healthcare Facilities

## CRE Task Force

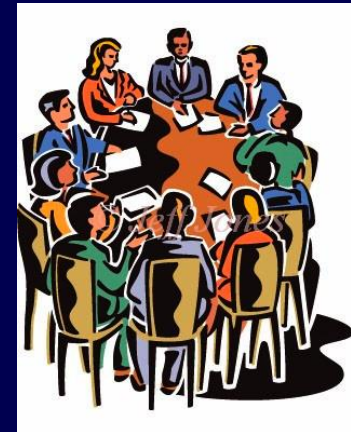
- Guide development of infection prevention and control recommendations

Phase 1: Acute care & long-term acute care hospitals

Phase 2: Long-term care facilities

Phase 3: Ambulatory and home care

- Members include IPs and Infectious Disease physicians



# MDH CRE Resources

- Recommendations for the Management of CRE in Acute Care and Long-Term Acute Care Hospitals, and In Long-Term Care
  - CRE-specific recommendations
    - Laboratory detection
    - Active surveillance testing
    - Admission screening for high risk patients
    - Contact precautions
    - Inter- and intra-facility communication
    - Antimicrobial stewardship
- Infection Prevention and Control Fact Sheet
- Inter-facility Transfer Form
- MDH CRE Patient Education Pamphlet

# MDH Communication with Surveillance Partners

- MDH CRE website
- Present at local conferences and Association for Professionals in Infection Control (APIC) meetings
  - CRE basics
  - MN data from passive surveillance (2009-2010)
- Provide case-by-case consultation to Infection Preventionists (IPs) and clinical laboratory personnel
  - Interpretation of results (e.g., KPC vs. CRE)
  - Facilitated chart reviews

# Minnesota Guide to a Comprehensive Antimicrobial Stewardship Program

Minnesota Guide to a Comprehensive  
Antimicrobial Stewardship Program



September 2012

# Prospective Laboratory-Based Surveillance-

- Active laboratory-based surveillance in Hennepin and Ramsey Counties began January 2011
- “Passive” surveillance ongoing state-wide

# MN CRE Surveillance, 2011

- 23 KPC + isolates
  - *E. cloacae* (12)
  - *K. pneumoniae* (10)
  - *C. freundii* (1)
- 20 KPC - isolates
  - *E. cloacae* (11)
  - *E. coli* (4)
    - NDM-1 positive (1)
  - *C. freundii* (3)
  - *K. pneumoniae* (1)
    - NDM-1 positive (1)
  - *E. aerogenes* (1)

# Conclusions

- **Population-based laboratory surveillance can be done!**
  - Resource intensive and requires close collaboration with public health lab, local clinical labs and IP community
- **Challenges include two different carbapenem breakpoint standards**
  - CLSI June 2010 vs. automated susceptibility system standards (regulated by U.S. Food and Drug Administration [FDA])
  - Most labs waiting for FDA to update cards
- **Lab liaison essential for establishing surveillance**
- **Success result of prior relationships with labs and IPs**
- **Great interest from microbiology supervisors, IPs and clinicians**

# Prevent a Post-Antibiotic Era



# MDH Resources

- CRE website

<http://www.health.state.mn.us/divs/idepc/dtopics/cre/index.html>

- Recommendations for the Management of CRE in Acute and Long-term Acute Care Hospitals

<http://www.health.state.mn.us/divs/idepc/dtopics/cre/recs.html>

- CRE Laboratory Testing and Protocols

<http://www.health.state.mn.us/divs/idepc/dtopics/cre/lab.html>

# Acknowledgements

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